

Polystichum pumilio belongs to the Andean group of *P. polyphyllum* Presl and is perhaps most closely related to that species itself. From *P. polyphyllum*, however, using that name even in its most inclusive conventional sense, it differs widely in its wholly non-spinulose and really minute segments. Although a dwarf in stature, it seems normal in every respect and gives no indication of being a reduced form of some species which normally grows to large size.

ZOOLOGY.—*Initial stratigraphic survey of nemas in the upper 20 mm. of marine beach sand, near low tide mark.*¹ N. A. COBB, Bureau of Plant Industry.

In 1916 studies at the laboratory of the Bureau of Fisheries, Woods Hole, Massachusetts, showed that sandy beaches, far from being utterly barren, carry a comparatively rich fauna of microscopic organisms. What biological and economic rôle these organisms may play is little known. Conceivably they may be more important than would at first be suspected. Recall that many larger aquatic organisms, at one period or another, may pass a certain amount of time on the bottom. During this sojourn their relationship to the microscopic inhabitants of the sand, mud, etc. constituting the bottom, is a matter about which we know very little, but it is easy to imagine that sometimes the relationship may be important. Again, the sand- and mud-inhabiting organisms themselves may be temporary stages (eggs, larvae) in a varied life history.

Such thoughts led to a stratigraphic examination of marine beach sand at Woods Hole, August, 1928. A small sheet-metal box, 10 centimeters square, carrying a series of thin metal slides was devised, such that by its aid layers of sand 5 mm. thick, lying one above another in series, could be collected (Figs. 1 and 2). In each of two collections four such successive horizontal layers were examined for their nemas. The results are indicated in the following tables:

Collection I:	Layer No. I	topmost	1st 5 mm.	100 sq. cm.	905 nemas
	" "	II	2nd "	" "	1,355 "
	" "	III	3rd "	" "	1,009 "
	" "	IV	4th "	" "	175 "
Collection II:	Layer No. I	topmost	1st 5 mm.	100 sq. cm.	1,512 nemas
	" "	II	2nd "	" "	1,403 "
	" "	III	3rd "	" "	981 "
	" "	IV	4th "	" "	226 "

Only two collections were made, as the census is a very tedious one. It will be seen that the two collections, taken a few yards apart, give

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rather consistent stratigraphic numbers; so that we may say, as a result of these two examinations, that probably the number of nemas in each successive layer decreases, rather gradually at first, but *rapidly* below the third 5 mm. layer; i.e., to a depth of about 15 mm. the sand is thickly populated with nemas; below that level the number falls off rapidly. The deeper layers contain fewer nemas, and fewer species.



Fig. 1. See also Fig. 2. Apparatus for collecting layers of sand and mud on beaches, mud flats, and at the bottom of ponds, lakes and seas. The unassembled apparatus is shown at the left; its use in collecting is explained in the successive illustrations in Figs. 1 and 2, reading from left to right. All the operations except the last must be performed at the time of collecting. The last operation may take place in the laboratory. The rectangular collecting box, with two sides missing, is forced into the sand or mud. The two missing sides (gate and loose bottom) are then inserted, as shown above. To insert the loose bottom the adjacent sand is pawed away.

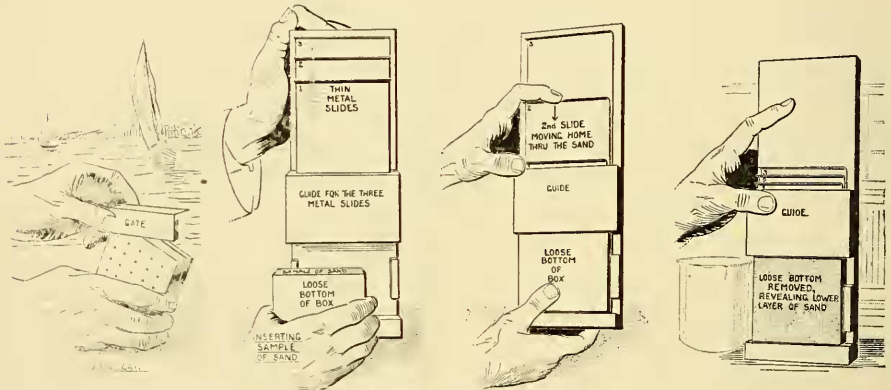


Fig. 2. See also Fig. 1. After the sample of sand is removed from the bottom, it is placed in a holder having three thin metal slides (1, 2, 3), that can be forced through the sand parallel to each other, thus cutting it into four layers;—in this case each layer is 5 mm. thick. After the slides are forced home, as shown at the right, the loose bottom of the box is removed, disclosing the lowest layer of sand,—5 mm. thick. This is washed into a beaker and treated as desired. The top of the box has fine perforations in order to allow the supernatant water to escape without disturbing the top layer of sand or mud. To prevent the possible escape of small organisms, this perforated top may be further covered with the finest bolting silk, stretched on.

Averaging the figures from the two collections mentioned above, it will be seen that, if they are typical collections, the beach sand examined carried about 3,742,000,000 nemas per hectare in the top 20 mm., or about 1,500,000,000 per acre. In 1916, but earlier in the summer, an examination of the same beach showed at least 1,040,000,000 per acre in the topmost inch of sand.